THE EFFECT OF OIL AND GAS TRANSMISSION PIPELINES ON EXPANDING URBAN USES IN EDMONTON AND ITS ENVIRONS

CITY PLANNING DEPARTMENT

EDMONTON ALBERTA

WORKING PAPER Nº 2

City Planning Department, The Effect of Oil and Gas Transmission Pipelines on Expanding Urban Uses in Edmonton and its Environs, Edmonton: Working Paper No. 2, 1967

Summary Report

Working Paper No. 2 (referred to as the Pipeline Study) examined oil and gas pipelines in the Edmonton area and the effect they have on urban development. The main emphasis of the Study was concerned with the costs the City of Edmonton must bear in facilitating these pipelines. The whole question of pipelines was studied by the Pipeline Study Committee of the Edmonton Regional Planning Commission and this report resulted from the need for a City of Edmonton submission on pipeline development in and around Edmonton.

To the City of Edmonton, pipeline development has become a problem, particularly in areas of residential expansion and peripheral development. The Edmonton area contains a maze of pipelines haphazardly located and causing excessive wastage of urban and potential urban land. As a result, the primary purpose of the Pipeline Study was to provide recommendations supporting the efficient expansion of pipelines in a planned pattern in full recognition of urban growth rather than in helter-skelter development across the countryside. A second aim of the Study was an attempt to indicate the cost the City of Edmonton absorbs in accommodating major oil and gas transmission lines according to the present distribution of pipelines in the Edmonton area.

The Edmonton area is replete with major pipelines; approximately fifty separate oil and gas transmission lines surround the City and, within a three and one-half mile radius, fifteen separate companies operate approximately 250 to 300 miles of pipeline. These pipelines are subject to Federal and Provincial regulations which stipulate the various technical aspects of application procedures, pipeline location, maintenance details and various financial obligations.

Pipelines running beyond the limits of one province are subject only to Federal jurisdiction while those located wholly within Alberta are subject to Provincial jurisdiction. A summary of the more important points of legislation is contained in the Study's appendices.

Chapter 3 of the Study outlines costs borne by the City of Edmonton in facilitating pipelines. These costs include: major road casings, minor road slabbings, pipeline shutdown and relocation, utility crossing of pipelines, landscaping development and maintenance, development restrictions, special road requirements and insurance against pipeline damage. These costs, in total, could represent a significant financial burden to the City in its urban expansion program if pipeline development continues in a haphazard manner. However, a number of these costs could be reduced by changes in procedures and technology as recommended in the Study and all future costs could be minimized by the careful future location of pipelines.

The recommendations of the Pipeline Study are summarized as follows:

1. It is important that the Edmonton Regional Planning Commission and the City of Edmonton continue to receive an adequate opportunity to discuss the proposed location of a pipeline with the developer in advance of land purchases or expropriation by the pipeline company.
2. The City of Edmonton should provide the Provincial Department of Mines and Minerals and the National Energy Board with its expansion plans indicating future roadway development and utility alignments. Thus when a pipeline company wishes to construct a new pipeline the government agency can inform them as to what construction procedure should be followed so that future municipal expenses in accommodating pipelines will be minimized.

3. It is recommended that major oil and gas pipelines do not locate in the path of land to be developed for purposes of residential land use. Particularly, the route of high pressure pipelines should avoid all residential communities of potential growth.

4. The Subdivision and Transfer Regulations should be amended so that the required fifty feet restriction against residential and commercial development is reduced.

5. The present Subdivision and Transfer Regulations should be changed to eliminate the stipulation necessitating the construction of a roadway parallel to a pipeline right-of-way in residential and commercial areas.

6. Where new pipelines are necessary, they should enter the Edmonton area only from the eastern metropolitan outskirts in the industrial areas and in so doing, they should, wherever possible, locate on existing rights-of-way. Before contacting the existing right-of-way in the eastern outskirts and upon approaching this route from, perhaps, the western metropolitan area, they should follow adjacent to section and quarter section lines keeping away at least six miles from existing City boundaries.

7. If it becomes necessary to locate additional lines in the general area of the existing concentration of pipelines in Edmonton's eastern outskirts, it is recommended that large pipeline corridors be implemented.
   This matter has also been considered by the Pipeline Study Committee of the Edmonton Regional Planning Commission and a map showing suggested corridors is included in this summary.

8. A formal presentation should be made to Provincial and Federal authorities (Mines and Minerals Department and the National Energy Board) regarding the

City's need for a more equitable distribution of responsibilities. It is suggested that these agencies give more study to the problems of locating lines in and adjacent to urban areas. Both technical and financial aspects as outlined in the Study, should be examined.


PROPOSED PIPE LINE CORRIDOR LOCATION
CORRIDOR
PORT OF ENTRY
May, 1968

City of Edmonton
Planning Department
Research Division

W O R K I N G P A P E R

No. 2

THE EFFECT OF OIL AND GAS TRANSMISSION PIPELINES ON EXPANDING URBAN USES IN EDMONTON AND ITS ENVIRONS

Fall, 1967
Research by
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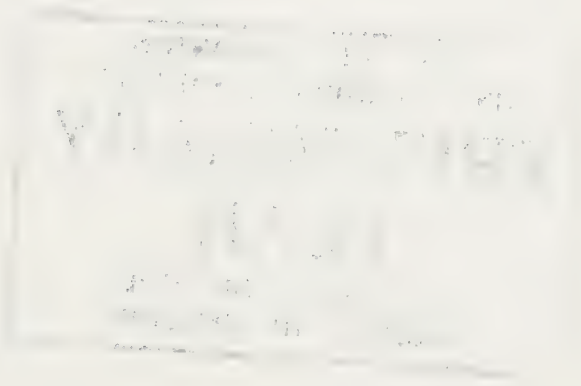

WORKING PAPER NO. 2

This report is the second of a series of "Working Papers" prepared by the Research Division. These Papers are intended to summarize research projects which do not warrant publication as a comprehensive "Research Report". The Working Papers are not perfect in form or content but rather contain relevant material of interest which would otherwise not be published.

Working Paper No. 2 is an examination of oil and gas pipelines in the Edmonton area and the effect they have on urban development. The main emphasis of the Paper is concerned with the costs the City of Edmonton must bear in facilitating these pipelines. The recommendations of the study are summarized in Chapter 4.

It is hoped that the information contained in this Paper will add to your library and be of assistance as similar problems arise in the future.

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INTRODUCTION

A. Statement of the Problem

The potential value of urban land in Edmonton and its vicinity is, in part, influenced by the location of pipelines. The alignment of oil and gas transmission systems has a significant effect on developing areas surrounding the City, and this report is intended to examine possible changes in City action regarding pipeline construction, regulations, and procedure, so that these facilities may be located in the least detrimental manner. The whole question of pipelines is being studied by the Pipe Line Study committee of the Edmonton Regional Planning Commission and the present study results from the need for a City of Edmonton submission on pipeline development in and around Edmonton.

B. Pipeline Development and Urban Growth

The continuation of the process of urban growth and the necessary control of such growth includes problems of resource development which face any region-serving municipality. The large regional centers, such as Edmonton, have survived and developed due to successful resource collection, processing, distribution, and consumption. The growth or decline of regional centers fluctuates with the demands for natural resources or facilities on which such centers were founded.

One must respect, therefore, the contributions that resources such

as oil and gas have made in aiding this community's prosperity. But, as in many cases of active resource development of large volumes, various unexpected control problems may develop for the regional center handling such a resource. To the City of Edmonton pipeline development has become a problem, particularly in areas of residential expansion and peripheral development. The Edmonton area contains a maze of pipelines haphazardly located and causing excessive wastage of urban and potential urban land. (Refer to drawing 3).

The primary consideration of this paper is to provide recommendations supporting the efficient expansion of pipelines in a planned pattern in full recognition of urban growth rather than in helter-skelter development across the countryside. To provide a sound working framework for such planning purposes, it is necessary to determine the costs involved in relation to development restraints pipelines have imposed in the Edmonton area. A second aim of this paper, therefore, is attempt to indicate the cost the City of Edmonton absorbs in accommodating major oil and gas transmission lines according to the present distribution of pipelines in the Edmonton area.

Chapter 2

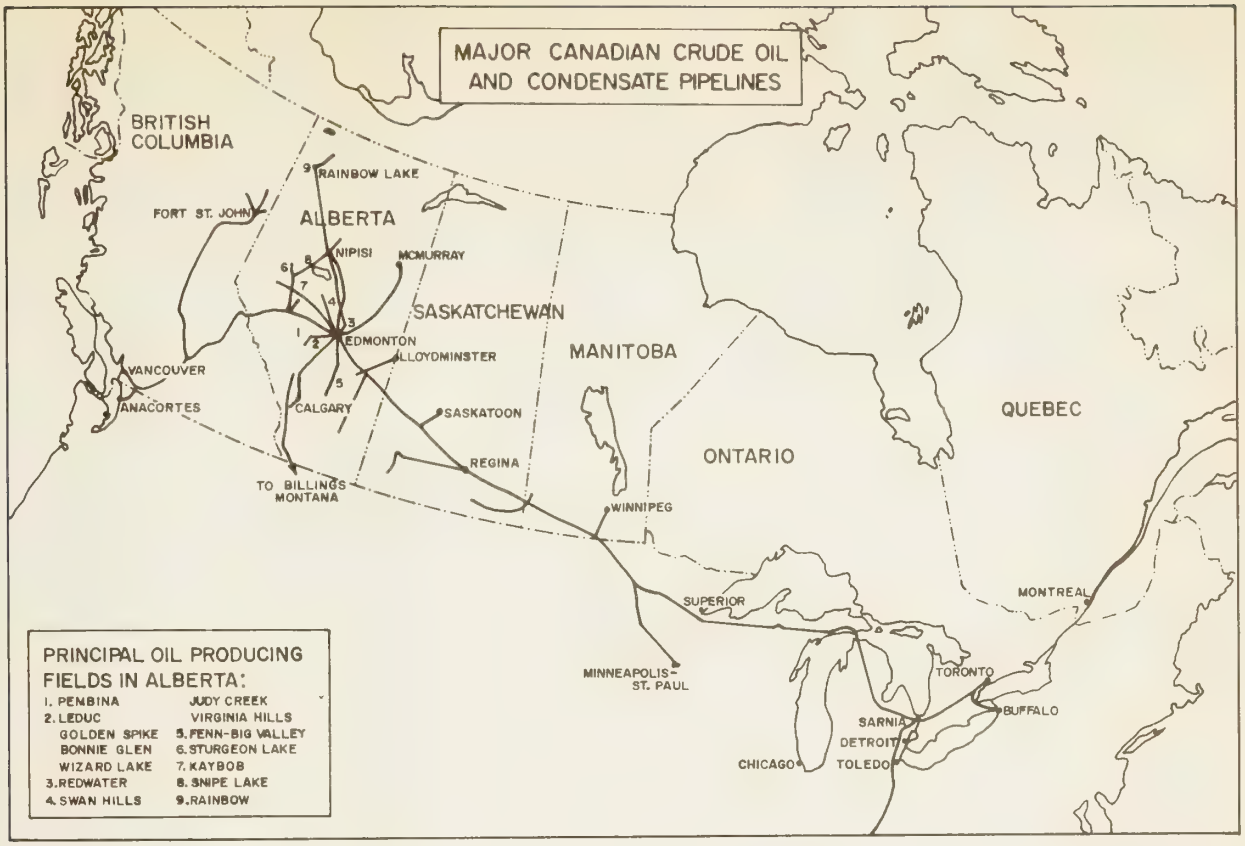
THE IMPACT OF OIL AND GAS PIPELINES ON THE EDMONTON AREA

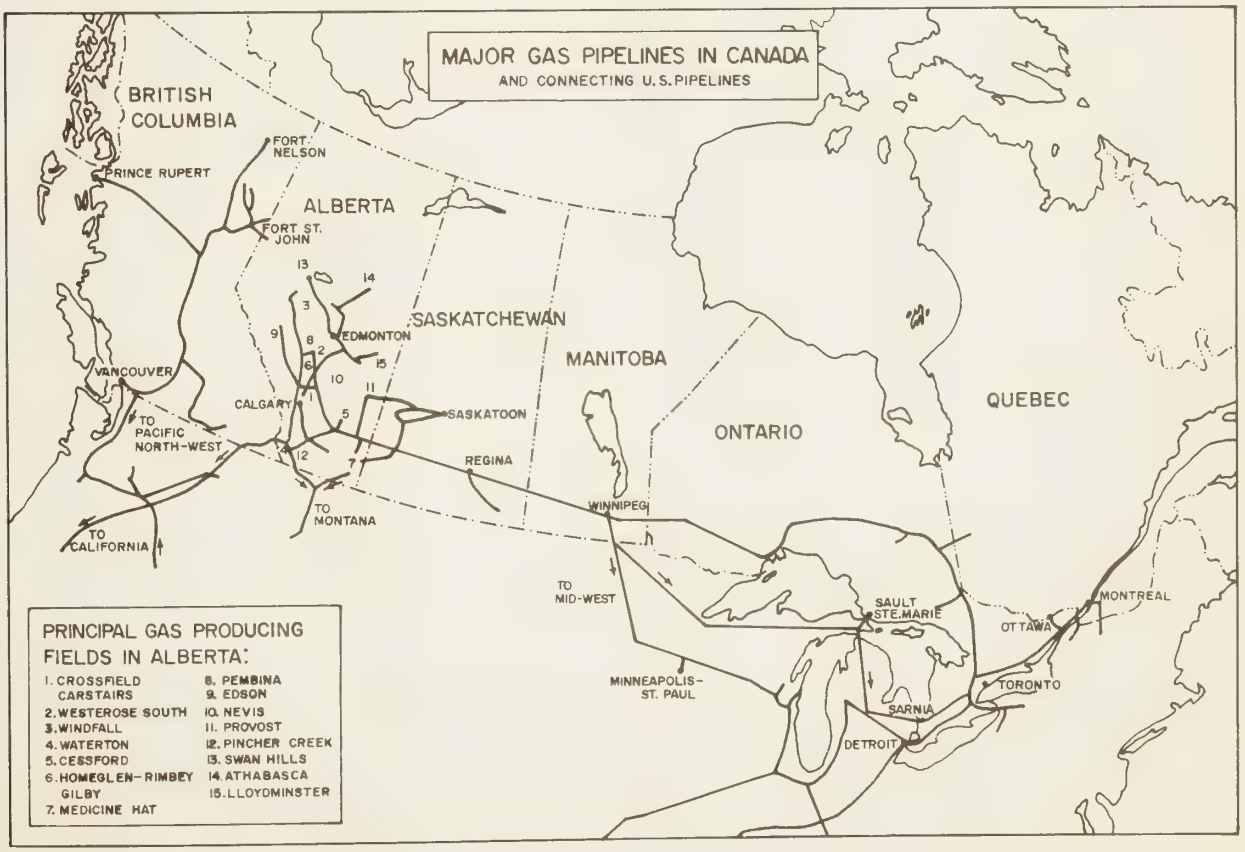
Pipelines have a significant effect on the urban areas through which they pass; land use patterns may be altered, planning proposals for potential urban land may be restricted. Subdivision regulations could necessitate costly alternative development proposals. This impact can be quite severe depending on the intensity of pipeline concentrations, the legislation governing operations, and the use of adjacent land.

A. The Nature and Extent of Pipelines in the Edmonton Region

Pipelines are a major element in Canada's vast transportation network. Since 1950 when pipelines were a negligible factor in inter-city freight traffic, growth has been so rapid that oil and gas pipelines now account for about one fifth of inter-city freight ton miles in Canada. Since 1950 the world's longest oil and gas pipelines, nearly two thousand miles in length, have been built to link the oil and gas fields of Alberta to major cities from Edmonton to as far east as St. Paul, Chicago, Detroit, Toronto, Buffalo, Sarnia, Sault St. Marie, and Montreal (Drawing 1). In addition, major lines hundreds of miles in length cross the Rockies and supply the lower mainland of British Columbia, the Pacific Northwest States, and California. The market radius in which Edmonton is centered is indeed extensive.

The City of Edmonton is also located in the heart of Alberta's oil and gas activity (Drawing 2). Lines from principel oil producing fields such as Leduc, Redwater, Swan Hills, Judy Creek, Fenn-Big Valley, Rainbow Lake, Snipe Lake, Pembina, Athabasca Oil Sands, and others, all penetrate into Edmonton's immediate area or pass within the City's corporate limits.



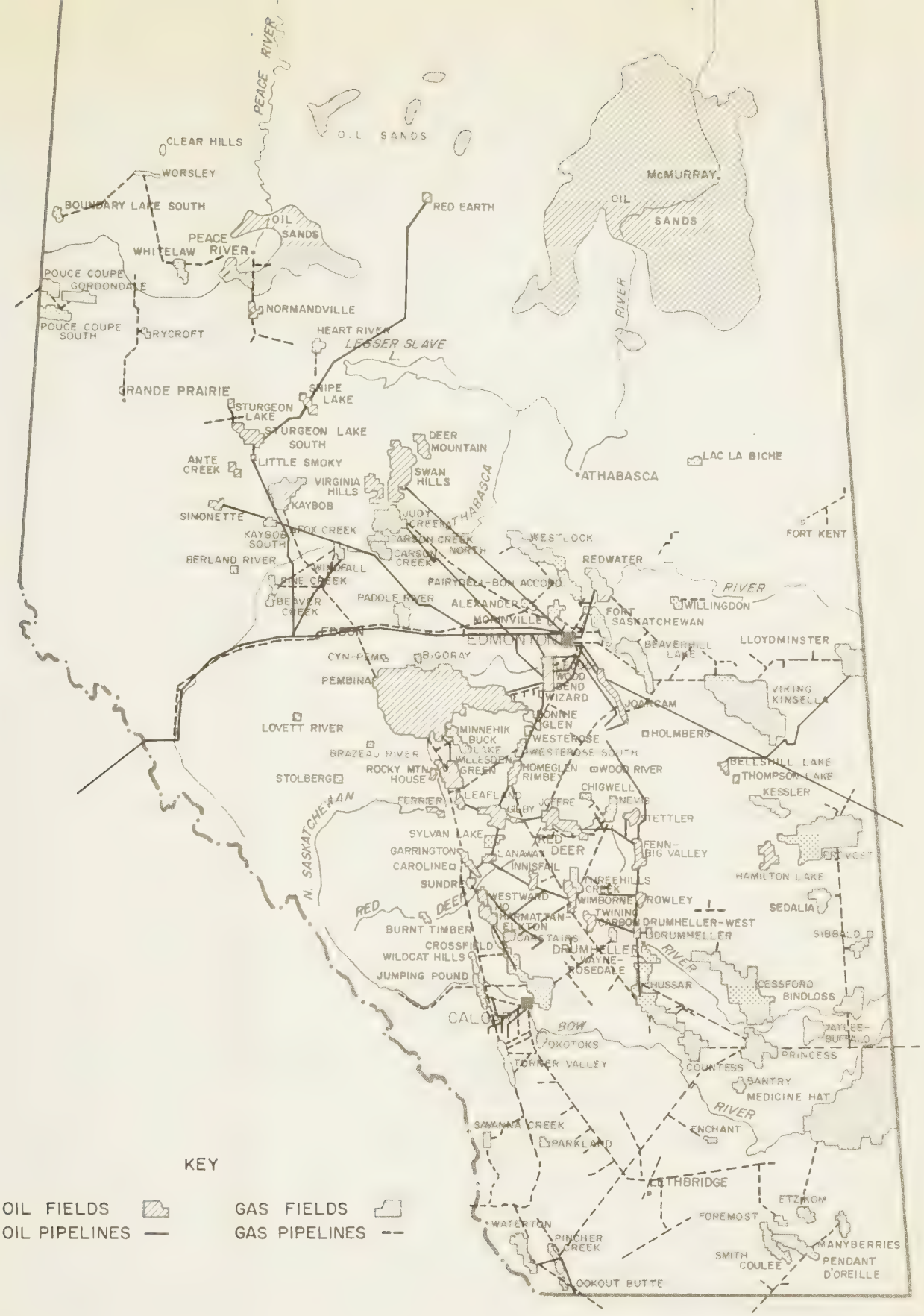


OIL AND NATURAL GAS PIPELINES, CANADA

Drawing 1

City of Edmonton
Planning Department

Aug. 1967



OIL AND NATURAL GAS PIPELINES, ALBERTA

Drawing 2

City of Edmonton
Planning Department

Aug. 1967

Some of the principal gas fields surrounding Edmonton include Viking - Kinsella, Beaverhill Lake, Westlock, Buck Lake, and Paddle River.

As a result, the Edmonton area is replete with major pipelines, as illustrated by Drawing 3 and Table 1. Approximately fifty separate oil and gas transmission lines surround the City; within a three and one half mile radius, fifteen separate companies operate approximately 250 to 300 miles of pipeline.

B. Role of Pipelines

The pipeline transport industry in Alberta focuses its transmission system in the Edmonton area where fuel processing plants, refineries, pumping stations, and tank farms are located. In "Refinery Row" on the eastern outskirts of the City fuel is produced for nearly all of western and northern Canada. Equally as important, the Interprovincial Pipeline Company and the Trans Mountain Pipeline Company both have their major terminals located on Refinery Row. Feeding their two trunk lines is a pipeline system funnelling oil from the many oil and gas fields in the region. The processed oil and gas is either shipped out to eastern and western markets or consumed in the Edmonton area by Edmonton's expanding petro-chemical industry.

C. Legislation Governing Pipeline Operations

The development of major pipelines in the Edmonton area has been subject to Federal and Provincial regulations which stipulate the various technical aspects of application procedures, pipeline location, maintenance details, and various financial obligations. Pipelines running beyond the limits of one province are subject only to Federal jurisdiction. The National Energy Board has jurisdiction over two major local pipeline firms, namely the Trans Mountain Pipeline and the Interprovincial Pipeline Companies. Pipelines located wholly within the Province of Alberta are subject to control order the

Provincial Pipeline Act of 1958. The Provincial Subdivision and Transfer Regulations indicates the manner in which land adjacent to pipelines is to be used. A summary of the more important points of this legislation is provided in the appendices. Edmonton has no jurisdiction over the location of pipelines.

Table 1

GENERAL DESCRIPTION OF PIPELINES

IN THE EDMONTON AREA

Company Owner*	Right-of Way Width+	Material Carried	Pipe Diameter	PSIG (lb./in.^{2} guage)	Licensed to Operate
Canadian Industrial	50'	Nat. Gas	10 3/4"	600	June 30/59
Federated Pipeline Co.	50'	Crude Oil	12 3/4"	733	March 2/59
Federated Pipeline Co.	50'	Crude Oil	8 5/8"	1090	Nov. 14/60
Federated Oil	50'	Crude Oil	16"	1035	May 16/66
Peace River Oil	15'	Crude Oil	12 3/4"	1200	Sept 25/62
Rainbow Pipeline (Mobil)	80'	Crude Oil	24"	780	Sept 12/67
Great Canadian Oil Sands	50'	--		--	1966
Britomoil Pipeline Co. Ltd.	--	Crude Oil	12 3/4"	1200	June 30/59
Edmonton Pipeline	33'	Crude Oil	6 5/8"	700	--
Pembina Pipeline Co.	50'	Crude Oil	16"	1290	June 30/59
Rimby Pipeline Co.	--	Misc.	8 5/8"	1200	Apr. 6/62
Rimby Pipeline Co.	33'	Crude Oil	3 1/2"	720	--
Texaco Exploration	--	Crude Oil	16"	720	Apr. 4/60
Texaco Exploration	--	Crude Oil	8 5/8"	720	Apr. 4/60
Texaco Exploration	33'	Crude Oil	--	--	--
Texaco Exploration	33'	Crude Oil	--	--	--
Imperial Oil	33'	Crude Oil	8 5/8"	750	Oct. 13/59
Imperial Oil	33'	Crude Oil	8 5/8"	750	Oct. 13/59
Imperial Oil	33'	Crude Oil	8 5/8"	750	Oct. 13/59
Imperial Oil	--	Crude Oil	8 5/8"	600	Oct. /59
Imperial Oil	--	Crude Oil	6 5/8"	600	Oct. /59
Imperial Oil	--	Crude Oil	8 5/8"	750	Feb. 5/60
Imperial Oil	--	Crude Oil	8 5/8"	655	Jan. 15/63
Nisku Products	30'	Crude Oil	3 1/2"	300	--
Nisku Products	--	Propane	4"	500	Feb. 10/64
Nisku Products	--	Nat. Gas	2"	500	Feb. 10/64
Nisku Products	--	Nat. Gas	3"	500	Feb. 10/64
Nisku Products	--	Butane	3"	500	Feb. 10/64
Interprovincial Pipelines	60'	Crude Oil	24"	--	--
Trans Mountain Pipelines	60'	Crude Oil	24"	--	Oct. /53
Canadian Chemical	--	Liquid	4 1/2"	1100 H.P.	Apr. 27/59
Canadian Chemical	--	Hydro-carbons	8 5/8"	1100 H.P.	Apr. 27/59

* Not listed are the numerous Northwestern Utilities lines.

\+ Where no right-of-way figure is listed the pipeline, in all likelihood, was combined with an existing right-of-way.

PIPELINES IN METROPOLITAN EDMONTON

Drawing 3
City of Edmonton
Planning Department
Aug. 1967

D. Pipelines and Adjacent Land Uses

The existing pipelines in the region have developed on a haphazard basis as far as the ultimate use of adjoining land is concerned. For example, the TransMountain Pipeline was constructed immediately proceeding residential development in the southwest and today it runs through an area of single family dwellings.

The encroachment of pipelines on existing and proposed residential, commercial, and industrial uses does create design difficulties and extra costs in accommodating the lines.

The position of Edmonton as major petroleum producer willnot decline in the forseable future. The total demand for Canadian crude oil in 1966 was 1,011,000 barrels per day (B/D). In 1967 this figure is expected to increase by 6.8 percent to 1,080,000 B/D. Alberta alone has produced more than half of the Canadian 1966 total 580,000 B/D. It has been forecast that by 1967 Canadian output will rise to 1,930,000 barrels daily increasing Alberta's production to about 1,000,000 B/D. These expected increases directly concern Edmonton in terms of providing facilities to meet future demands through the construction of additional pipelines, tank farms, processing plants, and so on.

The development of a pipeline transmission system in Alberta has greatly facilitated the provision of raw materials and finished products to the oil and gas industry thus allowing a considerable amount of centralization in processing. With the large amount of future development anticipated in

the construction of pipelines in and around Edmonton and with the continuous expansion of the City into areas already densely covered with existing pipelines, a knowledge of the expenses incurred by the City while expanding over areas containing pipelines, and especially areas containing pipelines haphazardly located, is very desirable. Chapter 3 outlines, in general, the costs the City must bear in developing areas in which pipelines are located.

Chapter 3

[illegible]

A. Costs and Legislation

Pipelines subject to the jurisdictions of the National Energy Board Act and pipelines subject to the Provincial Pipeline Act of 1958 have different specification standards to follow. Regulations governing the crossing of pipelines over provincial boundaries are clearly and firmly stated and cover nearly all the considerations necessary to determine the financial responsibilities of roadway and utility crossing of pipelines. The Provincial Act of 1958 deals primarily with the standard procedures for filing applications for pipeline development and contains passages devoted to the acquisition of land, distribution lines and private lines, the crossing of pipe over roadways, etc. but contains very little describing the crossing of roadways or utility lines by pipes. As opposed to the concise regulations contained in the National Energy Board Act, the Provincial Dept of Mines and Minerals resolves situations not covered in the Pipeline Act by arbitration and group discussions.

B. Underground Costs

The term "underground costs" includes: (1) those costs involved when a casing is required for a pipe passing beneath a road; (2) those costs involved in the depression of freeways where pipe realignment is necessary; (3) costs involved in maintaining specified road heights above the pipe; (4) shutdown costs incurred during a pipe realignment or casing construction; and (5) costs incurred when a utility line crosses a pipeline.

1. Road Crossing and Encasement

Provincial and Federal Regulations require that the carrier pipe

under highways or private roads shall, in all instances, be of sufficient strength to withstand safely all stresses and strains resulting from its location. Often a casing extending the full width of the road or right-of-way is required as it is cheaper to case the pipe than to lower it to a depth sufficient to safely withstand the road stresses.

a. The Regulation of Casing Costs

With reference to the National Energy Board Act, the applicant, who is the party proposing to construct a highway or private road across a pipeline, is directly responsible for all costs of encasement construction.[1] It is our understanding that this costing arrangement of pipelines under Provincial jurisdiction is similar. Thus a municipality would have to pay for all costs involved in the construction of casings over all existing pipe where roadways are built by the municipality.

b. Major Road Casings

The usage of the phrase "major roads" refers to freeways, expressways, and major arterials depending on the amount of traffic, type of traffic, and size of roadway. Generally, heavily used bus routes, truck routes, and main arterial outlets meet the requirements of a major road classification and are subject to steel casing requirements.

The cost of such a casing installment is roughly ten thousand dollars.[2] The City of Edmonton has spent twenty thousand dollars on the

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[1] National Energy Board Act, Section 8-9 (see Appendix B).

[2] This figure ($10,000) was taken from the City Engineers Department following various casing installations in Landsdowne and Petrolia. See Appendix A for a breakdown of casing operations, procedures, and materials needed in casing construction.

construction of two large steel casings, where the TransMountain Pipeline crosses 111th Street and 122nd Street. Drawing 4 presents locations where approximately 20 to 25 additional steel casings will be required at a cost of at least two hundred thousand dollars. This cost could easily increase due to higher labor and material costs, the lowering of pipelines where depressed freeways are to be constructed, and any additional pipelines that might be constructed in the Edmonton area before roadway construction occurs.

c. Minor Road Slabbings

The roadways included under the terms "minor roads", are the internal subdivision roads, residential collector streets, and the lightly travelled bus routes on major subdivision collector roadways. Unlike a typical casing which is installed in a circular pattern completely around the carrier pipe, the protective slab is merely laid in a sheet pattern directly above the pipe and beneath the road.

The cost of each slab various according to the width of the roadway, size of pipe, and the estimated volume of roadway traffice. For the most part, in determining the cost of the slab, the amount of concreate used in relation to roadway width is the main factor. An average slab of 4 feet in width and 38 feet long would cost about $1.10 a square foot or $170 per slab for labor, materials, and excavation.

Again, this amount alone seems insignificant, but approximately 100 slabs have been built up to 1965 at a cost to the City of approximately $17,000. The estimated cost of constructing slabs in the future is difficult to determine. Within the areas containing pipelines that are in the path of expansion, perhaps two hundred slabs might be needed over the next fifteen years.

2. Depressed Freeways

At the moment no depressed freeways exist over major oil and gas transmission lines in Edmonton. However, the suggested program for major depressed roadways, over pipelines, as indicated by Drawing 4 indicates a very substantial municipal cost.

Normally pipelines are installed approximately three to four feet below the earth's surface, with the exception of Northwestern Utility lines which are six feet deep. An intercepting roadway running horizontally along the same plane or below an existing pipeline and meeting that pipeline, means a pipe relocation problem because in most cases the pipe, where the underground conditions permit, would have to be depressed to a level four feet below the surface of the intended roadway.[3]

In determining the expense involved, the final figure would include such considerations as the size of pipe, the material flow in the pipe in terms of pounds per square inch (psig), whether a casing had existed or was required, the terrain and under whose jurisdiction the pipeline was administered. The following examples of three locations in south Edmonton where depressed freeways will be required will give some indication of costs.

The Trans Mountain Pipeline in southwest Edmonton and various Northwestern Utility pipelines are located within the path of proposed depressed freeways. Drawing 4 shows three points of roadway-pipeline contact where a depressed freeway is planned. Based on figures derived from the Engineering Department, a cost of $100,000 to $175,000 will be required to protect the Trans Mountain Pipeline adequately. It would be safe to suggest that at least $400,000 would be needed for the three intersections.

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[3] National Energy Board Act, Section 8-5.

PIPELINE PROTECTION REQUIREMENTS

Drawing 4

City of Edmonton
Planning Department

Aug. 1967

Briefly, then, the costs would be borne by the City[4] and the operational procedures would roughly entail: bringing in heavy-duty machinery for bending, coating and moving the pipe below the roadway surface; the cost of excavating; and bracing depressed ditches to the desired level of pipe placement. It has been suggested by a representative of the National Energy Board that a casing would be unnecessary, if the pipe could be relocated sufficiently deep to withstand all stresses and strains.

3. Pipeline Shutdown

A pipeline shutdown (decrease or stoppage in liquid flow) could occur in any phase of pipeline construction, maintenance, removal, repair, or realignment. If the pipeline was shutdown due to new road construction activity, the costs of shutdown would be borne by the agency constructing the road. To date, the City has not been involved in roadway construction where a pipeline shutdown was required. However, the three depressed freeways to be constructed in the immediate future as previously discussed will, in all likelihood, require pipeline shutdowns. In respect to shutdown costs if the pipeline was not operating at capacity, costs could be lessened for the shutdown would not effect the quantity that would be transported over a period of time. If the pipeline was operating at a capacity (24 hours a day at full flow) there would be no opportunity to make up for the shutdown.

4. Utility Crossing of Pipelines

a. Powerlines

Edmonton's Electrical Distribution System has incorporated underground cable lines in new residential areas running at a depth of three feet.

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[4]Refer to Appendix B, National Energy Board Act, Section 8-9.

Where pipelines are located in areas of new residential expansion, there will be an added cost to utility development.

Undernormal working conditions the cost of installing a power line three feet below the surface in a two foot wide trench is twenty-five cents a foot.

National Energy Board specifications requires all utility lines to cross a pipeline not less than twelve inches below the pipe at the point of intersection.[5] Pipelines are located three to four feet below the surface and consequently meeting the twelve inch specification results in extra development costs to the City. This cost is calculated by using a standard $2.50 per foot cost as opposed to the normal $0.25 per foot cost.

The application of these figures has been used as a result of three such crossings under the Trans Mountain Pipeline in Lansdowne. Five crossings are expected in the new proposed Duggan residential district; six are expected at Riverbend, five more at Rundle Heights in northeast Edmonton over the Northwestern Utility gas line; and two crossings are expected just further north of Rundle Heights along 34th Street. The total cost for these twenty-one power crossings of pipeline will approximately be $3,150.

For the most part, industrial areas receive power from overhead poles, consequently, underground cables meeting pipelines present little problem.

b. Water and Sewer Lines

Water and sewer lines, as a rule, maintain a depth ranging from eight and one-half feet to twelve feet. There would be little difficulty

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[5] National Energy Board Act, Section 8-4.

then in meeting the twelve inch clearance regulations previously mentioned, as pipelines seldom are placed deeper than four feet.

C. Surface Costs

The following discussion of "surface costs" includes primarily those areas not involved with underground cost implications. These are: right-of-way landscaping, subdivision costs, and costs for insurance against pipeline damage.

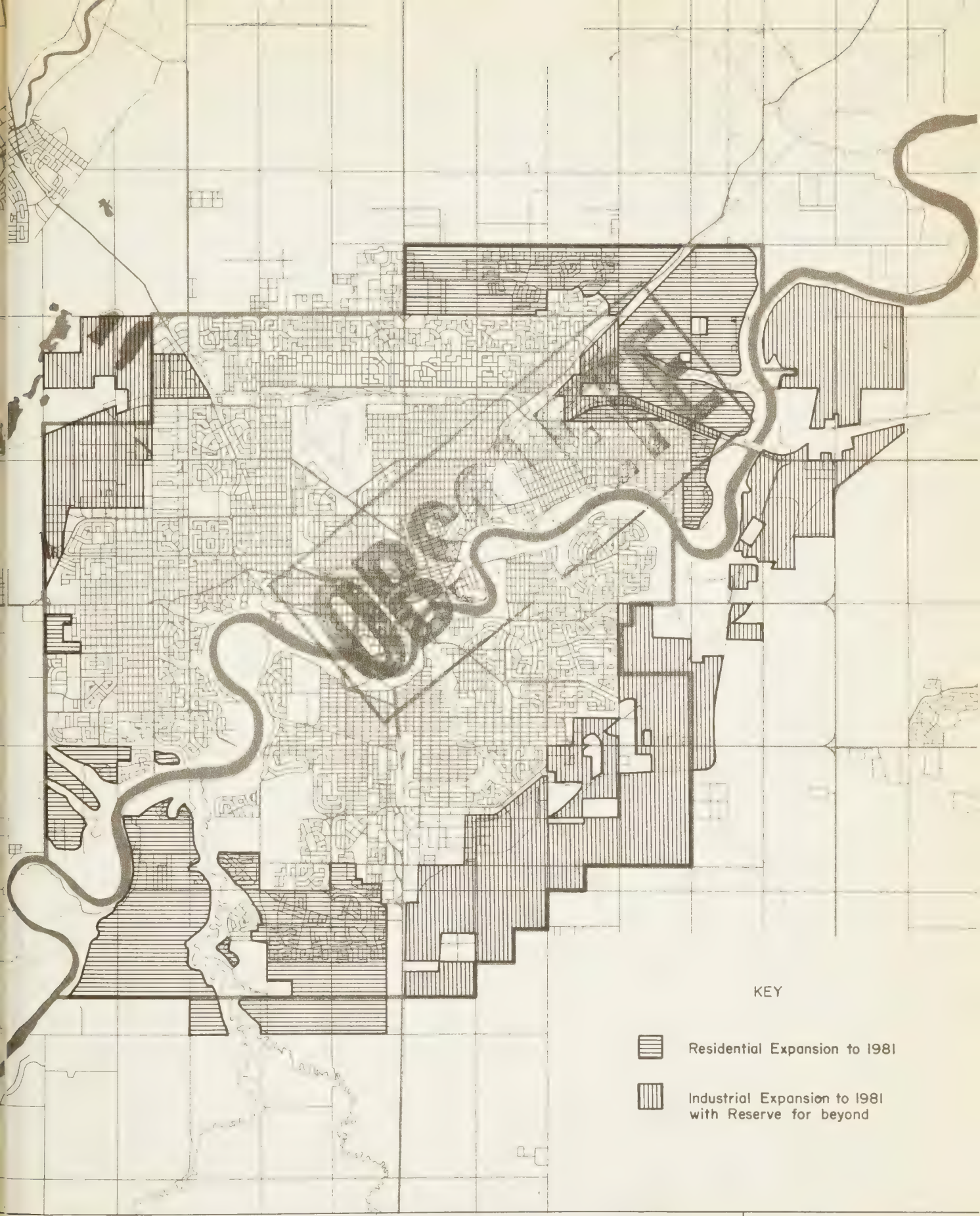
1. Right-of-Way Landscaping

a. Development Cost

During 1966-67, the City of Edmonton landscaped pipeline easements in southwestern Edmonton. The cost of developing a right-of-way surface (easement) is not directly absorbed by the City, but by the landowners in the particular district or subdivision. Special agreements have been executed between the City and Trans Mountain Pipeline in connection with a replotting scheme whereby the surrounding owners pay a frontage foot charge, to cover the costs of landscaping the easement. This relieves the City administration of the direct cost of landscaping but the significance indicated here is that the placement of this major pipeline in residential areas promotes an added expense to the City at large.

The subdivision districts of Petrolia and Lansdowne, Drawing 5, best illustrate the exact amount of costs involved as both areas will have completely landscaped easement surfaces by the fall of 1967.

For these two areas, which contain 11.4 acres of the Trans Mountain Pipeline easement, the Engineering Department covered 500,000 square feet with top soil at a cost of $50,000 (10¢ per square foot). An additional expense of two cents per square foot is needed to rotate, level off, seed,



PROPOSED RESIDENTIAL AND INDUSTRIAL EXPANSION AREAS

Drawing 5

City of Edmonton
Planning Department

Aug. 1967

and apply peat moss giving a total cost of $10,000. Therefore, a total of sixty thousand dollars was spent in these two districts containing the Trans Mountain Pipeline easement by the end of the summer of 1967.

One might also consider the Duggan and Riverbend districts, which contain the same pipeline easement. In total, another 500,000 square feet of land is involved, indicating a future expenditure of sixty thousand dollars to develop the right-of-way.

b. Maintenance Cost

Following the original surface development, the City must maintain the landscaping throughout the life of the pipeline. Each year the following work is administered:

i. 12 grass cuttings
ii. 2 fertilizer applications
iii. raking every spring

The total maintenance is $75 to $85 per acre per annum. Every year the cost of maintaining the right-of-way for the districts of Duggan, Lansdowne, Petrolia, and Riverbend will be $1,840 (at the present cost of labor).

Two other areas, in northeast Edmonton and the area south of Patricia Heights (Drawing 5) will require the necessary development and maintenance procedures for landscaping. The costs are shown on the accompanying table.

2. Subdivision Costs

Where any pipeline crosses or is situated in the vicinity of land which an applicant proposes to subdivide for residential purposes, the subdivision shall be designed so that the pipeline is located along a roadway or lane, and so that no building or any parcel be sited closer than fifty feet to the pipeline.[6] This necessity for proximity to a street or lane, in accordance with the Subdivision and Transfer Regulations, is creating a considerable expense for the City. Discussions with experts in the pipeline field have shown that there is no technical reason why buildings cannot be sited right to the edge of the pipeline easement. The pipeline, through the regulation of the pipe wall thickness, should be safe within the confines of its own easement.

Drawing 6 indicates roadway development surrounding a pipeline. Note the two lanes straddling the Trans Mountain Pipeline as well as the added roadway (124th Street). This type of pipeline - roadway development is present in the subdivision plans of Riverbend, Duggan, and in northeastern Edmonton. The cost of roadways adjacent to pipelines is absorbed by the City and the Following tables give a breakdown of the expenses involved, using the Petrolia and Lansdowne subdivisions as examples.

LANSDOWNE SUBDIVISION

Early in 1966, construction began on roadways surrounding the Trans Mountain Pipeline in Lansdowne. Due to the presence of the pipeline it was necessary to provide an additional 1,751 feet of lane and 521 feet of paved roadway over what normally would be necessary. The costs of these activities

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[6] Subdivision and Transfer Regulations, Section 37-3.

were as follows:

Table 3

ROAD COSTS CREATED BY PIPELINES IN LANSDOWNE

Activity	Footage		Approximate Cost per Assessable Foot	Total Expenses
Land Grading and Gravelling	1751'	X	$1.93	$ 3,379.43
Concrete Base plus Asphalt Surface (Roads)	521'	X	$8.37	$ 4,360.77
Concrete Curb and Gutter	521'	X	$2.44	$ 1,271.24
			TOTAL COST -	$ 9,011.44

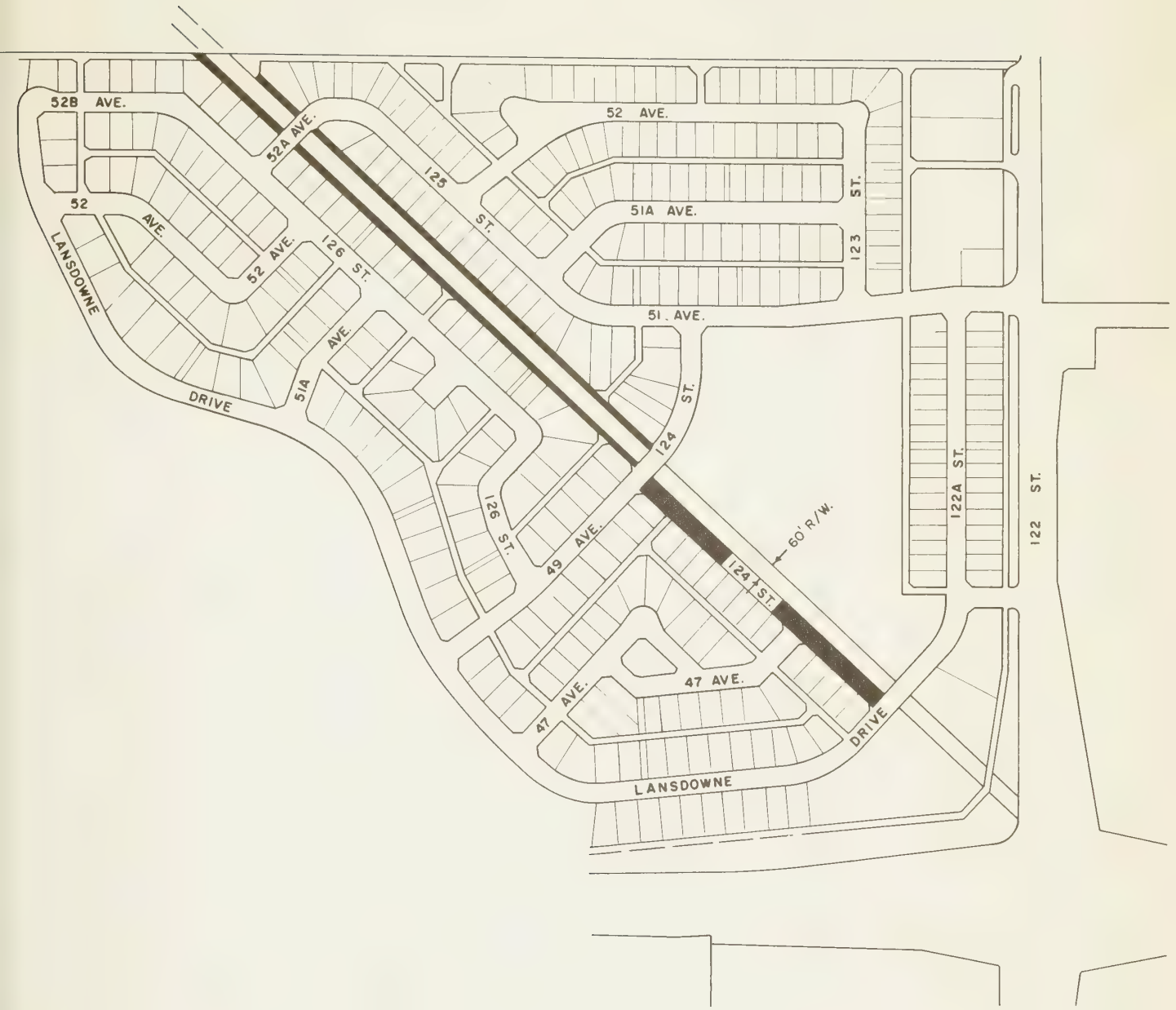
PETROLIA SUBDIVISION

In Petrolia beginning in 1965, a considerably larger degree of extra roadway activity surrounding pipelines was necessitated.

Table 4

ROAD COSTS CREATED BY PIPELINES IN PETROLIA

Activity	Footage		Approximate Cost per Assessable Foot	Total Expenses
Land Grading and Gravelling	1,800'	X	$1.93	$ 3,474.00
Concrete Base plus an Asphalt Surface	4,100'	X	$8.37	$34,317.00
Curb and Gutter	4,100	X	$2.44	$10,004.00
			TOTAL -	$47,795.00



0 250 500 1000

Scale in feet

LANSDOWNE SUBDIVISION
SHOWING EXTRA ROADWAYS

Drawing 6

City of Edmonton
Planning Department

Aug. 1967

Table 2

[illegible]

Name of Area	Total Acreage of Easement Surface	Total sq. ft. of Easement Surface	Easement Width	Development Cost Per sq. ft.	Total Development Cost	Maintenance Cost Per Acre	Total Maintenance Cost/Year
Lansdowne & Petrolia	11.4	500,000	60'	12¢	$ 60,000	$80	$ 912
Riverbend & Duggan	11.5	500,00	60'	12¢	$ 60,000	$80	$ 928
Northeast Edmonton*	30.3	1,320,000	50'	10¢	$150,000	$80	$2667
South of Patricia Heights	7.2	316,000	60'	10¢	$ 31,000	$80	$ 576
TOTAL	60.4	2,636,000	-	-	$301,600	-	$5003

*These are maximum figures for northeast Edmonton as part of the major Northwestern Utilities lines in this area with 50 feet easements located adjacent to roadways (34th Street), therefore, the extra landscaping costs of such a easement might be questionable.

Extra roadway development in the two areas have cost the City a total of $56,806. This total can be expected to double as further roads and lanes will be constructed where the Trans Mountain Pipeline cuts through the new proposed residential districts of Duggan, Riverbend, and, possibly, the area south of Patricia Heights.

Other residential districts which likely will need extra roadway development are those in northeastern Edmonton. By 1981 a great deal of the area indicated by Drawing 5 will be developed or developing and hence the roadway costs adjacent to the Northwestern Utilities and Canadian Industries easements could range as high as $150,000. Again, discussion with technical experts has shown there to be no technical reason why there have to be roads paralleling pipeline easements.

3. Insurance Against Pipeline Damage

The City of Edmonton, beginning in November, 1964, has taken out approximately one million dollars worth of liability insurance against the breakage of pipelines due to construction activity in the vicinity of pipelines.

a. From November 1, 1964 to October 30, 1965 the total liability insurance premium was $2,499.60 for the Petrolia, Lansdowne, and Duggan area.

b. From November 1, 1965 to November 1, 1966 the total liability insurance premium was $2,059 for the same areas.

The City has taken this method of protecting a possible large expense in the event that its own heavy machinery causes a pipe breakage in the course of servicing the area. Approximately $100,000 would be charged to the City if a major oil line is punctured by its equipment.

In summation, an annual cost averaging $2,350 will be paid for an indefinate period of time to cover pipeline insurance.

Chapter 4

RECOMMENDATIONS AND PROVISIONS FOR PIPELINE DEVELOPMENTS

The previous discussion of costs detailed those situations which best outlined Edmonton's expenses incurred in accommodating pipelines. In short, it indicated how the potential value of land is, in part, influenced by the pipeline being able to enter or pass through any part of it. However, merely relating the state of affairs or expected costs due to metropolitan growth is not satisfactory in formulating any beneficial future pipeline policy. Therefore, it is the intent of this chapter to suggest means to provide for the present and future occurance of pipelines in an efficient planned pattern in full recognition of urban growth and the influence pipelines have on such growth. The remaining discussion will propose recommendations providing for pipelines to pass through the Edmonton area in a least detrimental manner as possible.

RECOMMENDATION 1

It is important that the Edmonton Regional Planning Commission and the City of Edmonton continue to receive an adequate opportunity to discuss with the pipeline developer the location of the proposed line in advance of land purchases or expropriation by the pipeline company.

In the past it has been found that the City often does not get an opportunity to comment on the proposed pipeline route until the location of the line is quite firm and changing the route would create numerous problems. With the implementation of this recommendation the company intending to construct a line would directly contact the City and Regional Planning Commission thus giving them a chance to discuss, at an early stage, the location of the proposed pipeline. The City and Regional Planning Commission

should receive a report outlining in detail the proposed route together with large scale maps indicating the course of the pipeline.

RECOMMENDATION 2

The City of Edmonton should provide the Provincial Department of Mines and Minerals and the National Energy Board with its expansion plans indicating future roadway development and utility alignments. Thus when a pipeline company wishes to construct a new pipeline the government agency can inform them as to what construction procedure should be followed so that future municipal expences in accommodating pipelines will be minimized.

A reliable land use plan, indicating the location, character, and magnitude of development stages, presented to the government agencies would be of considerable value since it would solve any conflicts arising over "who was there first" or "who knew of each other's development policies first". The Department of Mines and Minerals considers this idea of "primary permanence" essential in deciding the outcome of a conflict of prior development rights and thus who pays succeeding development costs. For example, when future pipelines are constructed where roadways are anticipated, they should be laid at such a depth so as not to require casings. If casings were found to be necessary, their expense would be absorbed by the pipeline company if the roadway existed previous to the building of the pipeline or if the roadway's proposed route was indicated in a long-range expansion plan presented to the provincial and federal agencies in charge of pipeline development.

RECOMMENDATION 3

It is recommended that major oil and gas pipelines do not locate in the path of land to be developed for purposes of residential land use. Particularly the route of high pressure pipelines should avoid all residential communities of potential growth.

There would have to be exceptions to gas utility lines of at least .400 inch wall thickness at low pressure which service residential areas and to already existing pipelines within this path.

The basic reason supporting recommendation 3 is the high cost factor. Although the costs were quite tentative and, in some cases, only estimates, Chapter 3 showed how the costs of casings, pipe shutdowns, utility crossings, landscaping, subdividing and insurance were mainly applicable to the residential areas. Some of the more significant costs, like development, would apply to residential areas only. In addition, pipelines passing through residential areas sterilize large tracts of valuable land. For example, the Trans Mountain pipeline in Petrolia occupies approximately six acres of potential residential land.

RECOMMENDATION 4

The Subdivision and Transfer Regulation should be ammended so that the required fifty feet restriction against residential and commercial development is reduced.

For most pipelines, the fifty foot development restriction has little purpose, especially in terms of safety. The technology of pipe manufacturing and laying procedure is basically concerned with the safety features of fluid transmissions. In fact, so much confidence is placed on pipe strength that both company and government officials feel road casings are not required. It is interesting to note that large diameter pipelines operate within the residential and industrail areas of Houston, Texas, within a twenty feet right-of-way. Here, residential and commercial development occur within ten feet of the easement center line. With an advanced knowledge of pipeline activities, it is felt this is adequate operating room and hence this makes the subdivision and Transfer Regulation somewhat inconsistent with experience. The pipeline easement provides ample room for the maintenance, repair, and replacement of pipes.

RECOMMENDATION 5

The present Subdivision and Transfer Regulation should be changed

to eliminate the stipulation necessitating the construction of a roadway parallel to a right-of-way in residential and commercial areas.

As far as can be determined, this regulation serves no recognizable purpose, and is one of the major expenses in accommodating pipelines. It simply adds to the cost of extra roadways and their complementary facilities (,56,806 in the southwest residential area discussed in Chapter 3); it causes additional design problems and it contributes to a large amount of wasted residential land. The pipeline easement itself allows the company full access for any necessary work to be done to the pipe.

RECOMMENDATION 6

Where new pipelines are necessary, they should enter the Edmonton area only from the eastern metropolitan outskirts in the industrial areas as shown by Drawing 4 and, in doing so, they should, wherever possible, locate on existing rights-of-way. Before contacting the existing right-of-way in the eastern outskirts and upon approaching this route from, perhaps, the western metropolitan area, they should follow adjacent to section and quarter section lines keeping away at least six miles from existing City boundaries.

This would prevent the fragmentation of land and certainly preserve potential urban land and especially industrial development in the east.

Based on estimates of employment in manufacturing and related industrial areas, it is expected by 1981 that 5,200 additional acres of industrial land will be required within the City boundaries and 2,100 acres beyond City limits.[1] The industrial land required beyond City limits consists mostly of that area east of Edmonton containing the heaviest concentration of pipelines. In this area, as well up to this point in time, pipelines have restricted the availability and development of adjacent land to the industrial user. It is evident, as displayed by Drawing 3, that the pipelines, while conveying into one large area on route to their respective tank farms, refinery,

[1] General Plan estimates.

processing plant, etc., simply cut diagonally across sections, roads, farms, and municipalities. If this continues, industrial sites requiring adequate size, conducive to economic development, and properly situated will not be available; large capacity utility services and transportation facilities will be costly to provide and eventually a balanced and advantageous environment needed to draw in selective industries other than oil and gas types would, in part, be destroyed.

RECOMMENDATION 7

If it becomes necessary to locate additional lines in the general area of the existing concentration of pipelines in Edmonton's eastern outskirts, it is recommended that large pipeline corridors be implemented. The probability that Edmonton will expand into this area gives weight especially to this corridor recommendation in eliminating many of the expected costs.

A corridor system, or as it may be called, an extension of existing rights-of-way widths should be considered in a further study.

The following questions were considered by the Technical Committee of the Pipeline Study Committee and were summarized in a report by them:[2]

a) What type (locations and dimensions) of corridor?

b) Are there any alternatives to the pipeline problems other than a corridor?

c) At what period in time should corridors be formed?

d) What type of financing is involved in constructing or maintaining a corridor?

e) Who would adminster the corridor?

f) Will there be enough new pipelines involved to merit the success of a corridor system?

RECOMMENDATION 8

A formal presentation should be made to Provincial and Federal

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[2]See Edmonton Regional Planning Commission, Pipeline Study Committee, Technical Committee, Report of Meeting, September 1, 1967.

authorities (Mines and Minerals Department and the National Energy Board) regarding the City's need for a more equitable distribution of responsibilities. It is subbested that these agencies give more study to the problems of locating lines in and adjacent to urban areas. Both technical and financial aspects, as those outlined in this report, should be examined.

The National Energy Board and the Provincial Department of Mines and Minerals must be convinced that their attention to pipeline impacts upon urban areas should be increased. Perhaps these authorities might and a "Municipal Clause" in their respective regulations documents, following their examination of metropolitan growth and pipeline locations.

The construction of pipelines to date has taken place mainly in rural areas. The various regulations governing pipelines are best applied to rural areas. A brief look at Drawing 2 clearly places Edmonton on the natural geographic hub of almost two-thirds of the major oil fields in Alberta. Edmonton is the logical center for supply terminals, manufacturers and distributors of oil field equipment servicing companies, and oil and gas products. Hence the complimentary increase of numerous pipelines in the Edmonton region is most surely apt to choose the City as a destination. Edmonton should then be included in a "Municipal Clause" allowing for the abbreviation of many costs. Such elements, as the necessity of casings in terms of pipe strength under City roadways, the participation of pipeline companies in taking longer routes, giving the City some means of expressing its opinion prior to the granting of expropriation rights, and changing various stipulations such as in the subdivisions and transfer regulations, should be examined.

APPENDIX A

1. Operational Procedures in Casing Construction

   a. excavating around the pipeline to permit casing installation.

   b. cleaning and repairing the existing coating on the carrier pipe add applying a flush coat to the pipe.

   c. positioning casing sections around the pipe and welding them into place.

   d. coating the casing with coal tar channel and wrapping it with coal tar impregnated pelt.

   e. trench filling, compacting, and clean-up.

2. Materials Needed for Casing Installation

   a. casing pipe

   b. casings and steel adaptors

   c. insulating supports

   d. casing cradles

   e. casing end seals

   f. ventpiping and elbows

   g. coating and wrapping materials

   h. welding materials

   i. crossing marker signs completed with posts

   j. cathodic protection test tap assemblies and wire

APPENDIX B

NATIONAL ENERGY BOARD ACT
(excerpts)

Crossing of Pipelines by a Highway, Railway or Utility

Section 8 (4) A utility below ground level shall cross under a pipeline unless otherwise approved by the Board and and a clearance of not less than twelve (12) inches shall be maintained at the point of crossing between the utility and the pipe and all other underground structures.

(5) A highway or private road shall be so constructed that the travelled surface thereof shall be not less than four (4) feet above the top of the carrier pipe or casing pipe where casing is required, nor shall the bottom of the ditches be less than two (2) feet six (6) inches. . .

(9) All work of realigning, raising or lowering the pipeline or excavating material from under, over or around it, or the addition of casing or other appurtenances thereto, shall be performed by the authority having control over or the owner of the pipeline, as the case may be, and all costs and expenses of such work including any justificable economic losses resulting from any shutdown of the pipeline or any other consequential loss attributable to such work shall be borne and paid for by the applicant.

Powers of Pipeline Companies

Section 62 (1) A company may for the purposes of its undertaking, subject to the provisions of this Act and its Special Act,

(a) enter into and upon any Crown land without previous license therefore, or into the land of any person, lying in the intended of its pipeline, and make surveys, examinations or other necessary arrangements on such land for fixing the site of the pipeline, and set out and ascertain such parts of the land, as are necessary and proper for the pipeline;

(b) purchase, take and hold of and from any person any land or other property necessary for the construction, maintenance and operation of its

pipeline and alienate, sell or dispose of any of its land or property that for any reason has become unnecessary for the purpose of the lines

(c) construct, lay, carry or place its line across, upon or under the land of any person on the located line of the pipeline;

(d) join its pipeline with the transmission facilities of any other person at any one point;

(3) do all other acts necessary for the construction, maintenance and operation of its line.

APPENDIX C

[illegible]

Section 4 (1) No person shall construct a gas line, oil line or secondary line or any part thereof or undertake any operations preparatory to the construction thereof unless he is the holder of a permit.

(2) Notwithstanding subsection (1) but subject to the regulations, a person proposing to apply for a permit to construct a gas line, oil line or secondary line or any part thereof, or his agents may;

(a) enter upon any Crown or other lands lying in the intended route of the pipe line to make surveys or examinations, or

(b) negotiate for the acquisition of interests in lands that may be required for the pipe line.

Section 6 (1) The Minister may order an applicant to publish a notice with respect to the proposed route of the pipe line in such newspapers and in such form as the Minister may prescribe.

Section 23 (1) Any person who has the right to construct or operate a pipeline under this Act has the right to do so on, across, over or under any highway or road.

Section 24 (3) The land in which an interest is required for a pipe line parallel to a highway shall not be located nearer than one hundred feet to the boundary of the highway without the approval of the Minister of Highways.

Section 25 (1) No pipe line shall be constructed on, across, over or under any road without the approval of the local authority concerned, or, where approval cannot reasonably be obtained therefrom, without the approval of the Minister.

Section 34 (2) Where the Minister directs the alteration or relocation of any part of a pipe line, he may order the payment of such compensation as he may determine and by whom and to whom the compensation is payable.

Section 34a(1) No pipe line shall be constructed under a building used or capable of being used as public building, residence, office warehouse or factory without the approval of the Superintendent, and the Superintendent

may make his approval subject to such terms and conditions as he may prescribe.

Section 39 Where, after the commencement of this Act, a person requires an interest in land for the purposes of his pipe line the interest may be acquired in lands owned by the Crown or by any other person;

(a) by negotiation with the owner

(b) by an order under The Right of Entry Arbitration Act

(c) by an order under The Water, Gas, Electric and Telephones Companies Act

(d) by an order under The Expropriation Procedure Act.

APPENDIX D

THE SUBDIVISION AND TRANSFER REGULATION
(excerpts)

Section 37 (3) Where any pipe line as defined in The Pipe Line Act, 1958 crosses or is situated in the vicinity of land which an applicant proposes to subdivide, the subdivision shall be designed

(a) so that the pipe line is located within the right-of-way or parallel to and alongside a quarter section line or the right-of-way of a public roadway or lane, and

(b) so that no building or parcel so created in the proposed plan of subdivision shall be sited closer than 50 feet to the center line of the pipe line right-of-way, whichever is the lesser.